

Application No.: 09/240,632

Docket No.: 20402-00568-US

Withdrawal of the objection to the specification is requested in that corrections have been made obviating the concerns raised in item 4 of the Office Action.

Withdrawal of the rejection of claims 1, 3-13, 36, and 38-48 under 35 U.S.C. § 112, is requested. The claims have been amended to make the claims consistent with the specification. Further, the specification has been amended to more clearly recite the relationship between the pilot signal and data obviating the concerns raised in the Office Action.

Withdrawal of the rejection of claims 6-13 and 49-59 is requested. The claims have been amended to avoid the concerns raised in the Office Action.

Withdrawal of the rejection of claim 33 under 35 U.S.C. § 102(b) as being anticipated by Furuya (U.S. Pat. No. 5,577,087) is requested. The present invention exemplified by claim 33 provides a transmission apparatus for transmitting a digital signal. The digital signal is converted into a pair of I and Q baseband signals, and is regularly subjected to a first and second modulation.

The device disclosed in Furuya (U.S. Pat. No. 5,577,087), provides for switching between modulators, depending on a signal level condition. The condition for switching modulators does not regularly subject the input digital signal to first and second modulations, different from each other. Instead, it depends upon the signal conditions being experienced, and does not constitute "regularly subjecting an input digital signal for first and second modulation...". Whereas the present application describes a system for alternately interleaving QPSK and APSK signals, the Furuya (U.S. Pat. No. 5,577,087) reference appears only to transmit one or the other, depending on signal conditions.

Withdrawal of the rejection of claims 33, 38 and 49 under 35 U.S.C. § 102(b) as being anticipated by Seki et al. (EP 0734132 A2) is requested. The system described in the EP 132 reference, makes use of a null symbol generator 12. The null symbol appears in each frame, and corresponds to a pilot symbol. The receiver in the EP 132 reference utilizes the reference symbols to correct for amplitude and phase variations (see in particular lines 16-32, in col. 13). Thus, the modulation requires separate reference symbols, additional to the QPSK information symbols.

Application No.: 09/240,632

Docket No.: 20402-00568-US

This is distinguished from the present invention, in that only the second modulation signal is necessary for demodulation. As set forth in the application, the invention generates in accordance with Fig. 7 a pair of symbol streams. The first symbol in each frame is used as a pilot signal, and no other reference signal is needed for demodulation of the frame.

Withdrawal of the rejection of claim 37 under 35 U.S.C. § 103 as being unpatentable over Furuya (U.S. Pat. No. 5,577,087), in view of Alamouti et al. (U.S. Pat. No. 5,933,421) is requested. Claim 33, as was noted earlier, is distinguished from Furuya (U.S. Pat. No. 5,577,087) in that it provides for regularly subjecting an input digital signal to a first and second modulation, to produce a pair of baseband I and Q signals. As noted previously, the cited reference only makes a switch between modulation depending on the quality of signal transmission received. In this sense it does not "regularly subject" an input digital signal to first and second modulations.

Claim 37 dependent thereon carries these limitations as well. Further, in reviewing the cited reference to Alamouti et al. (U.S. Pat. No. 5,933,421), it is not seen where there is any generation of I and Q signals which regularly produce first and second modulated signals, as presently claimed. Thus each reference would appear not to disclose alternately subjecting the digital signal to first and second modulations, on a regular basis. Accordingly, it is not seen how the combination of the references can yield or disclose the subject matter of the claims.

Withdrawal of the rejection of claims 49 and 50 under 35 U.S.C. § 103 as being unpatentable over Furuya (U.S. Pat. No. 5,577,087) in view of Alamouti et al. (U.S. Pat. No. 5,933,421) is requested. Claim 51 depends on claim 49. Claim 49 requires that input digital signal be subjected to a first and second modulation as well. The second modulation signal is inserted as a pilot signal into the first quadrature baseband signal.

As noted previously, Furuya (U.S. Pat. No. 5,577,087) does not regularly insert such a pilot signal, derived from a second modulation system for modulating the input digital signal on a regular basis.

Application No.: 09/240,632

Docket No.: 20402-00568-US

Alamouti et al. (U.S. Pat. NO. 5,933,421), as well as Wong (U.S. Pat. No. 5,027,372) fails to disclose this feature as well. Accordingly, no combination of these references will yield or suggest the subject matter of these claims.

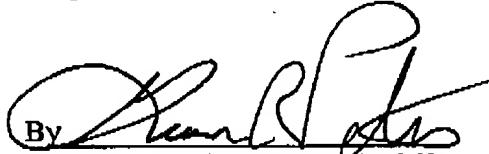
Withdrawal of the rejection of claims 38-40 under 35 U.S.C. § 103(a), as being unpatentable over Seki et al. (EP 0734132 A2), in view of Alamouti et al. (U.S. Pat. No. 5,933,421) is requested. Claim 38 has been amended and is clearly described as generating a first multi-value modulation signal and a second modulation signal, of a second multi-value, which is used as a pilot signal. The signal is inserted in the first modulation signal and is used as pilot symbol to estimate the channel condition at the receiver. In reviewing the Seki et al. (EP 0734132 A2) patent, as noted previously it differs from the present invention in requiring a separate pilot signal for demodulation, whereas in the present invention, a signal derived through the second modulation is used to estimate a channel distortion for frequency offset. Thus, only the second modulation signal is needed rather than a separate pilot signal.

Alamouti et al. (U.S. Pat. No. 5,933,421) fails to disclose this feature as well, and no combination of Alamouti et al. (U.S. Pat. No. 5,933,421) with Seki et al. (EP 0734132 A2) will yield or disclose this subject matter.

In view of the foregoing, a favorable reconsideration is requested and an early allowance is solicited.

Dated: April 10, 2003

Respectfully submitted,



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Application No.: 09/240,632

Docket No.: 20402-00568-US

MARKED-UP REVISIONS**IN THE SPECIFICATION:**

Page 20, first paragraph should read:

During an initial stage of signal transmission, the switch 12D selects the output I signal from the reference signal generator 12C while the switch [12D] 12E selects the output Q signal from the reference signal generator 12C. During an interval of time which follows the initial stage, the switch 12D alternately selects one of the output I signal from the APSK modulator 12A and the output I signal from the QPSK modulator 12B at a predetermined period, and transmits the selected I signal to the RF portion 15. During the time interval following the initial stage, the switch 12E alternately selects one of the output Q signal from the APSK modulator 12A and the output Q signal from the QPSK modulator 12B at the predetermined period, and transmits the selected Q signal to the RF portion 15.

IN THE CLAIMS:

1. (Amended) A method for modulation, comprising the steps of:

regularly subjecting an input digital signal to first modulation and second modulation to convert the input digital signal into a pair of a baseband I signal and a baseband Q signal, the first modulation and the second modulation being different from each other; and

outputting the pair of the baseband I signal and the baseband Q signal;

wherein the first modulation is at least [4] 8-signal-point modulation, and the second modulation is phase shift keying;

wherein the phase shift keying provides periodically-spaced symbols which represent corresponding portions of the input digital signal in terms of differences between phases of the periodically-spaced symbols; and

wherein the at least [4] 8-signal-point modulation assigns logic states of the input digital signal to respective signal points for a first symbol in response to a signal point used by a second symbol of the phase shift keying which precedes the first symbol.

5. (Amended) A method as recited in claim 1, wherein the at least [4] 8-signal-point modulation is at least [4] 8 quadature amplitude modulation.

Application No.: 09/240,632

Docket No.: 20402-00568-US

13. (Amended) A method as recited in claim 1, wherein a maximum of amplitudes corresponding to signal points of the at least [4] 8-signal-point modulation in an I-Q plane is equal to an amplitude of a signal point of the phase shift keying in the I-Q plane.

37. (Amended) A transmission apparatus as recited in claim 33, wherein the symbols provided by the phase shift keying [comprise] are used as a pilot symbol for estimating at least one of (1) a transmission path distortion and (2) a frequency offset.

38. (Amended) A modulation method for modulating an input digital signal into a multi-value symbol stream, the modulation method comprising:

generating a first multi-value modulation signal having first multi-value symbols with a [first multi-value modulation system] first modulator;

generating a second modulation signal containing second multi-value symbols by using a second modulator which are to be used as [data and a] pilot symbol estimating at least one of (1) a channel distortion and (2) a frequency offset for demodulating said first multi-value modulation signal in a receiver; and

inserting said second [modulation signal containing data and a pilot symbol as a pilot signal] multi-value symbols into said first multi-value symbols such that the resultant multi-value symbols constitute said multi-value symbol stream [modulation signal].

39. (Amended) A modulation method as recited in claim 38, [further comprising deriving at least one of] (1) said channel distortion and (2) said [a] frequency offset [for a receiver from the pilot signal] are estimated from each of said second multi-value symbols.

40. (Amended) A modulation method as recited in claim 38, [or 39.] wherein differential encoding is done between symbols of the second modulation signal.

42. (Amended) A modulation method as recited in one of claims 38 [to 41], wherein the second modulation signal is phase shift keying (PSK) modulation.

Application No.: 09/240,632

Docket No.: 20402-00568-US

45. (Amended) A modulation method as recited in one of claims 38 [to 41], wherein the first modulation signal is quadrature phase shift keying (QPSK) modulation.

46. (Amended) A modulation method as recited in one of claims 38 [to 41], wherein the first modulation signal is at least 8-value modulation.

48. (Amended) A modulation method as recited in one of claims 38 [to 41], wherein the first modulation signal is 16QAM and the second modulation signal is PSK modulation, and a maximum signal point amplitude of the second modulation system is equal to 0.9 to 1.5 times a maximum signal point amplitude of the first modulation signal.

49. (Amended) A transmission apparatus comprising a first multi-value modulation system for subjecting an input digital signal to first modulation and outputting a first quadrature baseband signal, a second modulation system for subjecting the input digital signal to a second modulation and outputting a second quadrature baseband signal, wherein said second quadrature baseband signal is [producing a second modulation signal as a pilot signal] regularly inserted as a pilot signal into the first quadrature baseband signal [multi-value modulation system] wherein said second quadrature baseband signal is used [the pilot signal includes a pilot symbol] for estimating a frequency offset and a channel distortion in a receiver.

51. (Amended) A transmission apparatus as recited in claim 49 [or 50], wherein differential encoding is done between symbols of the second modulation system.

53. (Amended) A transmission apparatus as recited in one of claims 49 [to 52] or 51, wherein the second modulation system is phase shift keying (PSK) modulation.

Application No.: 09/240,632

Docket No.: 20402-00568-US

56. (Amended) A transmission apparatus as recited in one of claims 49 [to 52] or 51 or 51, wherein the first modulation system is quadrature phase shift keying (QPSK) modulation.

57. (Amended) A transmission apparatus as recited in one of claims 49 [to 52] or 51, wherein the first modulation system is at least 8-value modulation.

59. (Amended) A transmission apparatus as recited in one of claims 49 [to 52] or 51, wherein the first modulation system is 16QAM and the second modulation system is PSK modulation, and a maximum signal point amplitude of the second modulation system is equal to 0.9 to 1.5 times a [a] maximum signal point amplitude of the first modulation system.

COPY

Serial No. 09/240, 2	Atty Docket No: 402, 3
Applicant: Yutaka Murakami et al.	Resp./Bill Atty: ML
Due Date: N/A	

The following was/were received in the U.S. Patent and Trademark Office on the date stamped hereon.

Amendment (or Response)	IDS with references
Petition for -Mo. Ext. of Time	Issue Fee Transmittal FEB 18 1999
Response to Restriction Req.	Notice of Appeal
Response to Missing Parts	Appeal Brief
Executed Declaration or POA	Maintenance fee transmittal
2 Priority Document(s)	Request for Refund
Assignment(s) & cover sheet	Request for corrected Filing Receipt
Req. to Approve Drawing Changes	Other:
Sheets formal drawings	Check No. _____ for \$

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

COPY

Yutaka Murakami et al.

Serial No. 09/240,632

Art Unit: To be assigned

Filed: February 1, 1999

Examiner: To be assigned

For: MODULATION METHOD
AND RADIO
COMMUNICATION SYSTEM

Atty Docket: 402/568

SUBMISSION OF CERTIFIED PRIORITY DOCUMENT(S)

and

CLAIM TO PRIORITY UNDER 35 U.S.C. § 119Assistant Commissioner for Patents
Washington, D.C. 20231

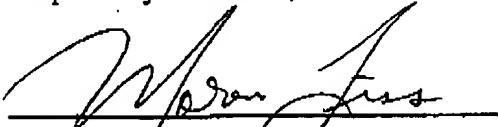
Sir:

Priority under 35 U.S.C. § 119 is hereby claimed to the following priority document(s), certified copies of which are enclosed. The documents were filed in a foreign country within the proper statutory period prior to the filing of the above-referenced United States patent application.

<u>Country</u>	<u>Priority Document Serial No.</u>	<u>Filing Date</u>
Japan	10-018593	January 30, 1998
Japan	10-044983	February 26, 1998

Acknowledgement of this claim and submission in the next official communication is respectfully requested.

Respectfully submitted,



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Date: 2/19/99